Surname and name _____

Lessons 09 and 10: Proportionality and percentages and Algebra.

1. Calculate 'x' in the following proportions. Include your operations.

a. $\frac{x}{3}=\frac{7}{5}$

b. $\frac{8}{x}=\frac{x}{2}$

c. $\frac{-5}{4}=\frac{x}{2}$

a. $\frac{x}{3}=\frac{7}{5}$ $x=\frac{3\cdot 7}{5}=\frac{21}{5}=4,2$

b. $\frac{8}{x}=\frac{x}{2}$ $x^2=16$; $x=\sqrt{16}=4$

c. $\frac{-5}{4}=\frac{x}{2}$; $x=\frac{-5\cdot 2}{4}=\frac{-10}{4}=-2\frac{1}{5}$

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2. I paid 12 cents for 3 photocopies.

Price (cents)	8	20		
Number of copies			40	75

a) Complete the gaps in the table according to this information. You have to include your operations below.
b) What are the magnitudes and the constant of proportionality?

I paid 12 cents for 3 photocopies.
a) Complete the gaps of table according to this information. You have to include your operations below.
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Price (cents)	8	20	160	300
Number of copies	2	5	40	75

Price(c) Copies(n°)

12 — 3
8 — x

$x = \frac{24}{12} = 2$

12 — 3
20 — x

$x = \frac{60}{12} = 5$

12 — 3
x — 40

$x = \frac{12 \cdot 40}{3} = 160$

Price(c) Copies(n°)

12 — 3
x — 75

$x = \frac{12 \cdot 75}{3} = 300$

b) Magnitudes: Price and Copies

$\frac{12}{3} =$ 4c/copy

[1] Consumo

3. 5 students are going to spend[1] 8 hours decorating the classroom for a party. But one of them got sick[2] and he couldn't make it. How long would it take[3] now?

students(n) Time(h)

5 — 8
4 — x

$x = \frac{5 \cdot 8}{4} =$ 10 hours

[1] emplear.
[2] enfermo.
[3] Llevará.

Surname and name _____

4. A fridge costs €75.16 after a 12.5% discount. What was the original price?

x : original price

$100 - 12'5 = 87'5\% = 0'875$

$0'875 \cdot x = 75'16$

$x = \frac{75'16}{0'875} = 85'9€$

5. a) What is an equation?
b) When do we use unknowns?
c) How do you say if two equations have the same solution?
d) What is the best operation to compare two quantities?
e) What is a percentage?

6. The formula to change Celsius degrees into Fahrenheit is: $F = \frac{9}{5} \cdot C + 32$. What is the temperature in Fahrenheit degrees if the thermometer reads –15ºC.

a) $F = \frac{9}{5} \cdot (-15) + 32 = \frac{-135}{5} + 32 = -27 + 32 = 5\,°F$

7. Solve the equation and check your solution: $5(3x + 2) - 8x = 8x - (4x - 1)$

$15x + 10 - 8x = 8x - 4x + 1$

$15x - 8x - 8x + 4x = 1 - 10$

$3x = -9$

$x = \frac{-9}{3} = -3$

Surname and name _____

8. Solve the equation and check your solution: $\frac{x}{3}-\frac{1}{2}+\frac{x}{6}=\frac{2x}{9}-\frac{2}{3}$

$$\frac{6x}{18}-\frac{9}{18}+\frac{3x}{18}=\frac{4x}{18}-\frac{12}{18}$$

$$6x-9+3x=4x-12$$

$$6x+3x-4x=-12+9$$

$$5x=-3\ ;\ x=\frac{-3}{5}$$

9. I bought 2 notebooks and 4 pens for €70. A pen cost 1 euro more than a notebook. What was the price of each? Write an equation and solve the problem.

x : notebooks

x+1 : pens

$$2x+4(x+1)=70$$

$$2x+4x+4=70$$

$$6x=66\ ;\ x=\frac{66}{6}=11$$

Notebook : 11 euros

Pen : 12 euros

Surname and name _____

10. Answer the following questions for the algebraic expression $\frac{5y-10}{4}$. Simplify the resulting fraction as much as possible:

a. Find the numerical value for y = 0
b. Find the numerical value for y = 2
c. Find the numerical value for y = -4
d. Find the numerical value for y = -2.

a. Find the numerical value for y = 0

$$\frac{5 \cdot 0 - 10}{4} = \frac{-10}{4} = \frac{-5}{2}$$

b. Find the numerical value for y = 2

$$\frac{5 \cdot 2 - 10}{4} = \frac{10 - 10}{4} = \frac{0}{4} = 0$$

c. Find the numerical value for y = -4

$$\frac{5 \cdot (-4) - 10}{4} = \frac{-20 - 10}{4} = \frac{-30}{4} = \frac{-15}{2}$$

d. Find the numerical value for y = -2.

$$\frac{5 \cdot (-2) - 10}{4} = \frac{-10 - 10}{4} = \frac{-20}{4} = -5$$